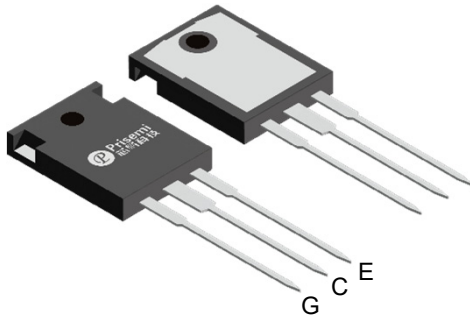
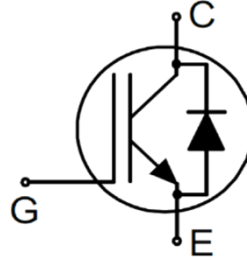
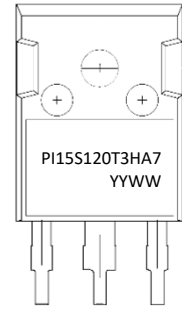


Description

TO-247-3L

Circuit Diagram

Marking (Top View)
Feature

- Low switching power loss
- Low switching surge and noise
- Advanced Field Stop technology
- Low EMI
- Qualified according to JEDEC for target applications
- Pb-free lead plating, halogen-free mold compound, RoHS compliant
- Internal insulation

Applications

- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- EV Charger
- Inverter

Absolute maximum rating@25°C

Parameter	Symbol	Value	Units	
Collector-Emitter Voltage	V_{CES}	1200	V	
Gate-Emitter Voltage	V_{GES}	± 20	V	
Transient Gate-emitter Voltage ($t_p \leq 10\mu s$, $D < 0.010$)		± 30		
Collector Current	I_C	$T_c = 25^\circ C$	30	A
		$T_c = 100^\circ C$	15	
Pulsed Collector Current	I_{CM}	60	A	
Diode Forward Current	I_F	$T_c = 25^\circ C$	30	A
		$T_c = 100^\circ C$	15	
Diode Maximum Forward Current	I_{FM}	60	A	
Power Dissipation	P_D	$T_c = 25^\circ C$	185	W
		$T_c = 100^\circ C$	93	
Operating Junction Temperature	T_J	-40~+175	$^\circ C$	
Storage Temperature	T_{STG}	-55~+150	$^\circ C$	
Wave Soldering Temperature for 10 sec	T_L	270	$^\circ C$	
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	0.81	$^\circ C/W$	
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	1.45	$^\circ C/W$	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^\circ C/W$	

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units		
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_{CE}=250\mu A$	1200	-	-	V		
C-E Leakage Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	-	-	1.0	mA		
G-E Leakage Current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$	-	-	± 250	nA		
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	4.5	5.9	7.0	V		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=15A, V_{GE}=15V$	$T_c=25^\circ C$	-	1.8	2.4	V	
			$T_c=150^\circ C$	-	2.3	-		
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	1216	-	pF		
Output Capacitance	C_{oes}		-	60	-			
Reverse Transfer Capacitance	C_{res}		-	29	-			
Turn-on Delay Time	$t_{d(on)}$	$V_{CE}=600V, V_{GE}=15V, R_G=10\Omega, I_C=15A$	$T_c=25^\circ C$	-	34	-	ns	
			$T_c=150^\circ C$	-	32	-		
Rise Time	t_r		$T_c=25^\circ C$	-	18	-		
			$T_c=150^\circ C$	-	21	-		
Turn-off Delay Time	$t_{d(off)}$		$T_c=25^\circ C$	-	200	-		
			$T_c=150^\circ C$	-	213	-		
Fall Time	t_f		$T_c=25^\circ C$	-	134	-		
			$T_c=150^\circ C$	-	186	-		
Turn-on Energy Loss	E_{on}	$V_{CE}=600V, V_{GE}=15V, R_G=10\Omega, I_C=15A$	$T_c=25^\circ C$	-	1.03	-	mJ	
			$T_c=150^\circ C$	-	1.05	-		
Turn-off Energy Loss	E_{off}		$T_c=25^\circ C$	-	0.67	-		
			$T_c=150^\circ C$	-	0.88	-		
Total Switching Loss	E_{st}		$T_c=25^\circ C$	-	1.7	-		
			$T_c=150^\circ C$	-	1.93	-		
Total Gate Charge	Q_g		$V_{CE}=600V, V_{GE}=15V, I_C=15A$	-	69	-		nC
Gate to Emitter Charge	Q_{ge}			-	10	-		
Gate to Collector Charge	Q_{gc}	-		38	-			
Diode Forward Voltage	V_F	$I_F=15A$	$T_c=25^\circ C$	-	2.1	3.2	V	
			$T_c=150^\circ C$	-	1.7	-		
Reverse Recovery Time	t_{rr}	$I_F=15A, di/dt=100A/\mu s$	-	31	-	ns		
Reverse Recovery Charge	Q_{rr}		-	27.5	-	nC		
Reverse Recovery Current	I_{rrm}		-	1.7	-	A		

Typical Characteristics

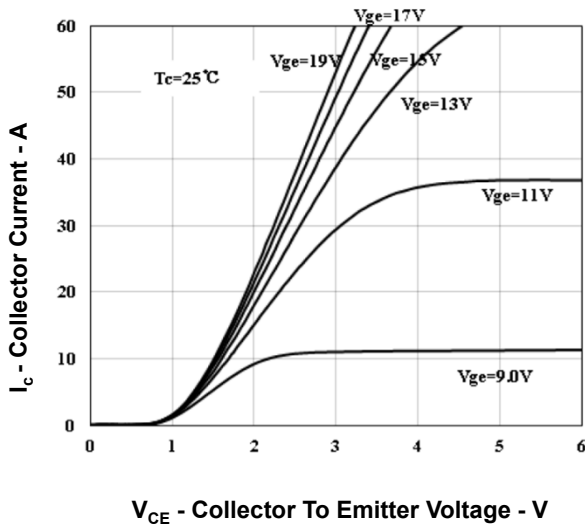


Fig.1 Output Characteristic

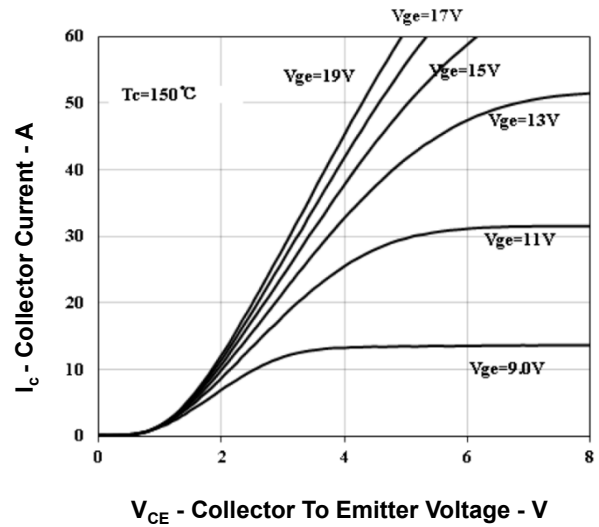


Fig.2 Output Characteristic

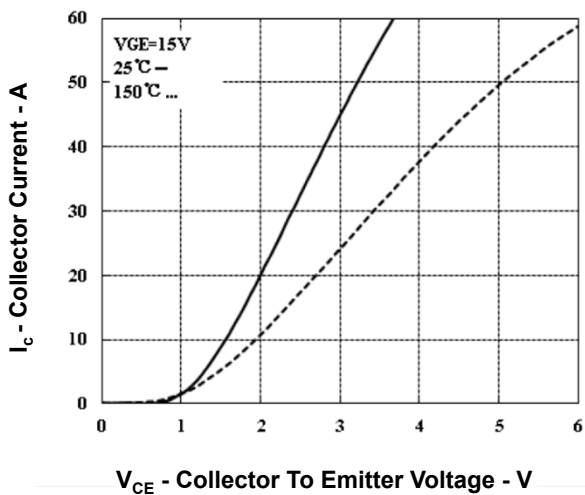


Fig.3 Saturation Voltage Characteristics

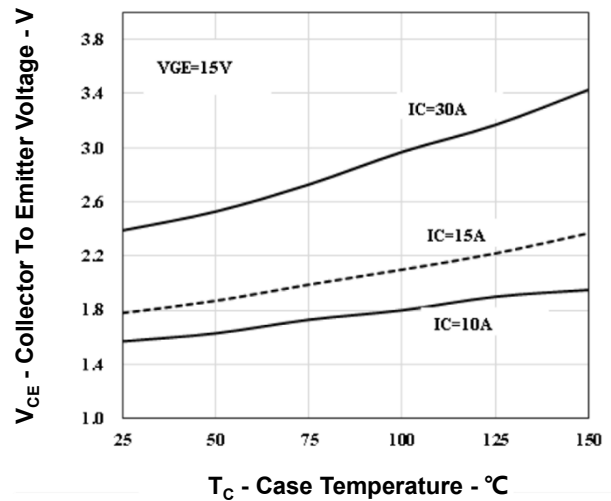


Fig.4 Saturation Voltage - T_c Characteristics

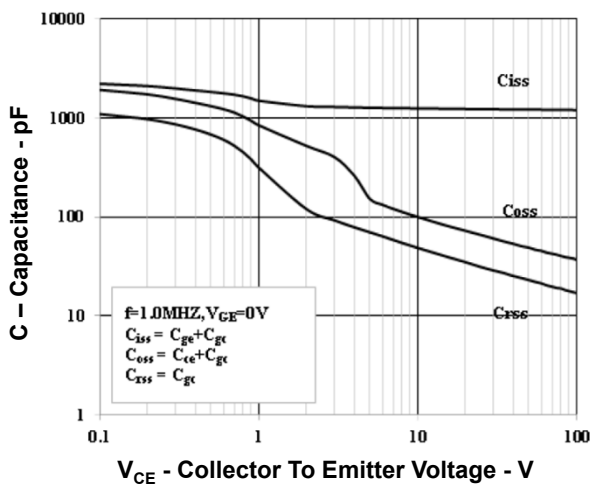


Fig.5 Capacitance Characteristics

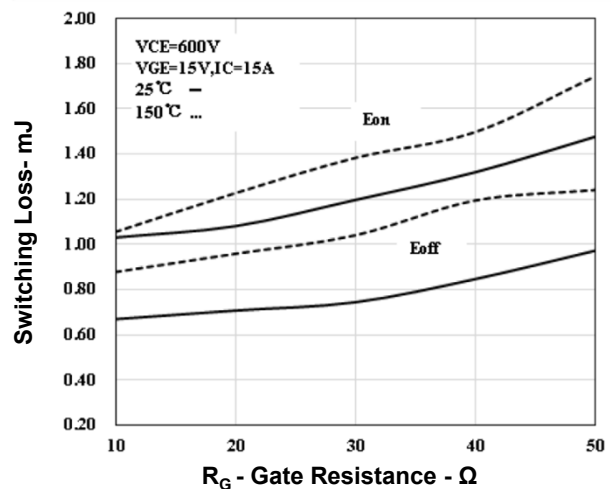


Fig.6 Switching Loss - R_G Characteristics

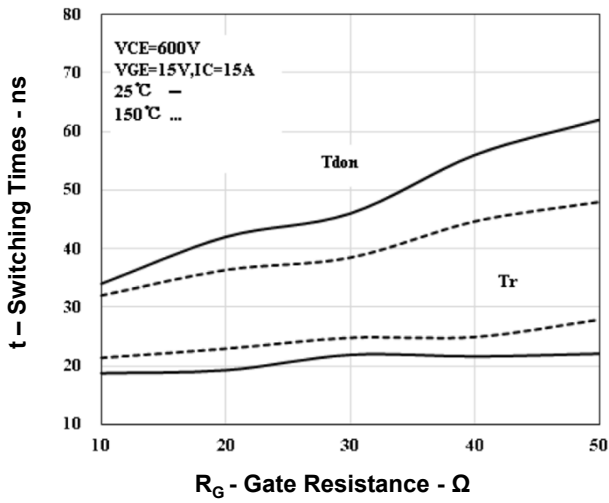


Fig.7 Switching Time - R_G Characteristics

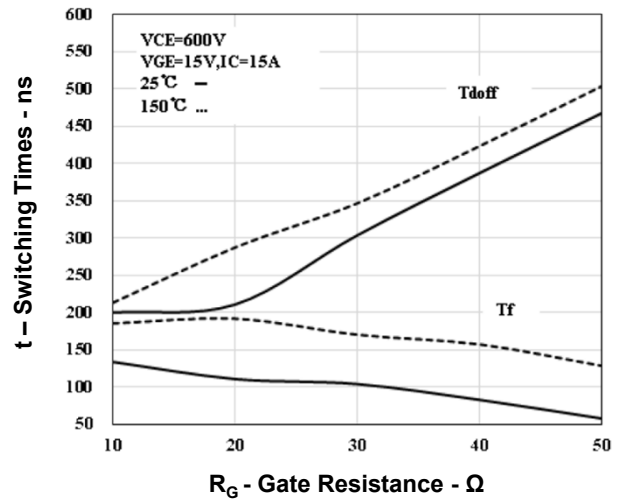


Fig.8 Switching Time - R_G Characteristics

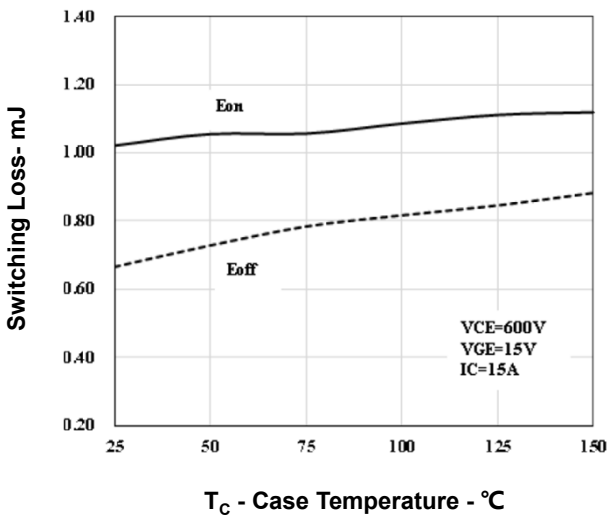


Fig.9 Switching Loss - T_C Characteristics

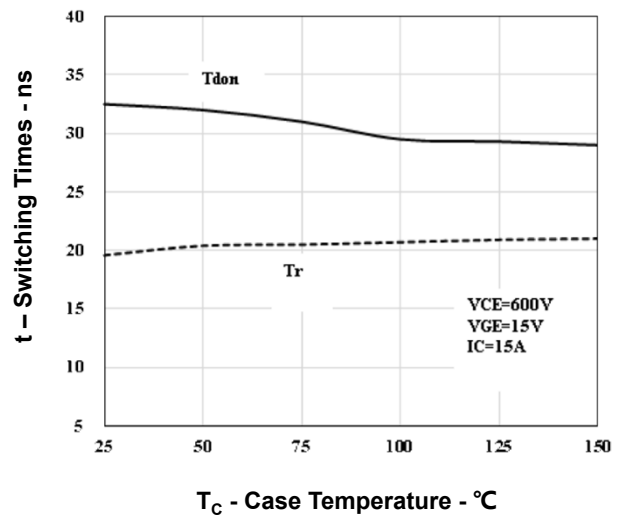


Fig.10 Switching Time - T_C Characteristics

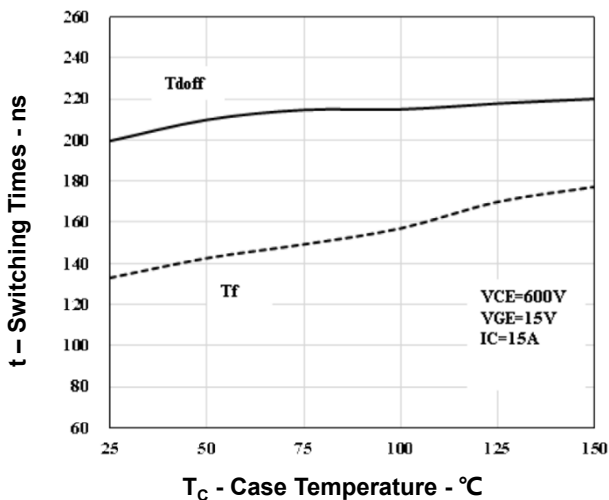


Fig.11 Switching Time - T_C Characteristics

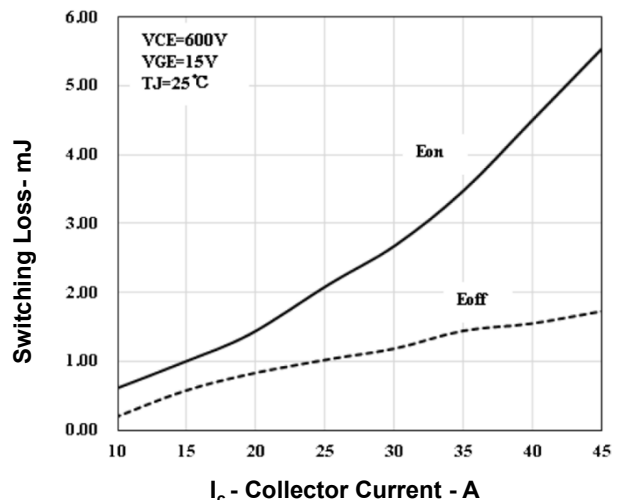


Fig.12 Switching Loss - I_C Characteristics

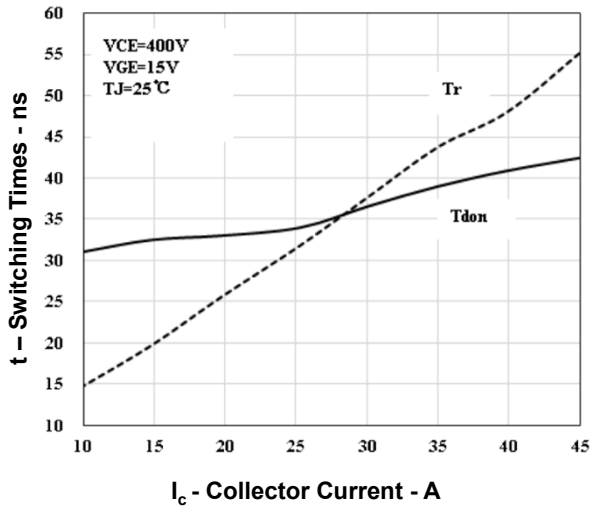


Fig.13 Switching Time - I_C Characteristics

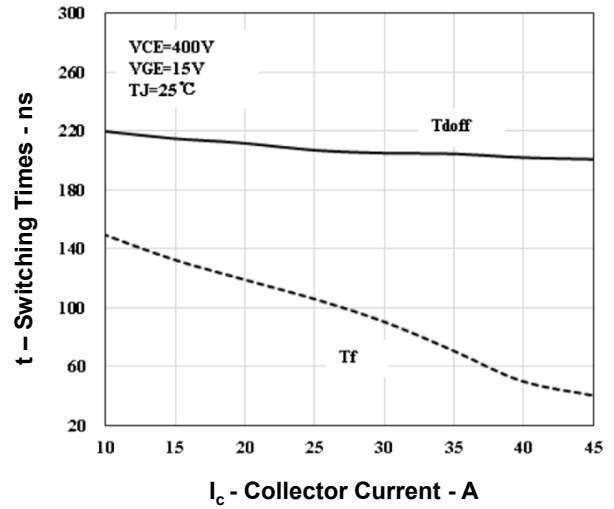


Fig.14 Switching Time - I_C Characteristics

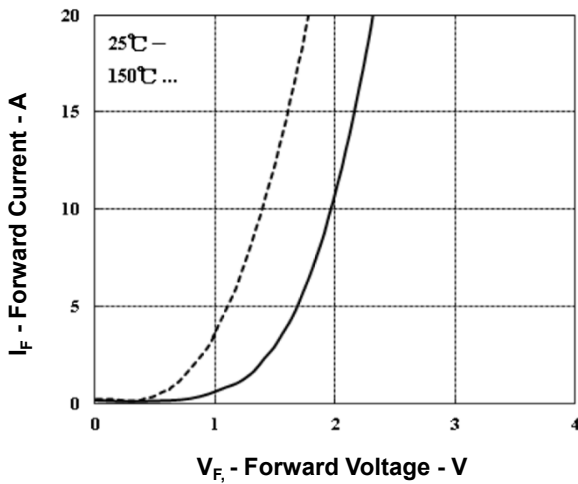


Fig.15 Diode Forward Current - Forward Voltage

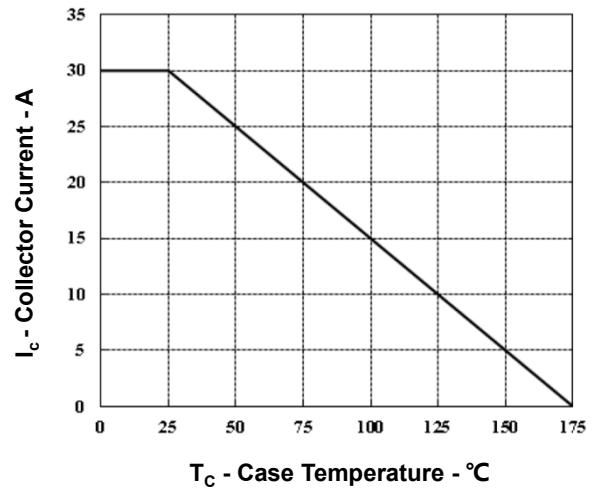


Fig.16 Collector Current - T_C Characteristics

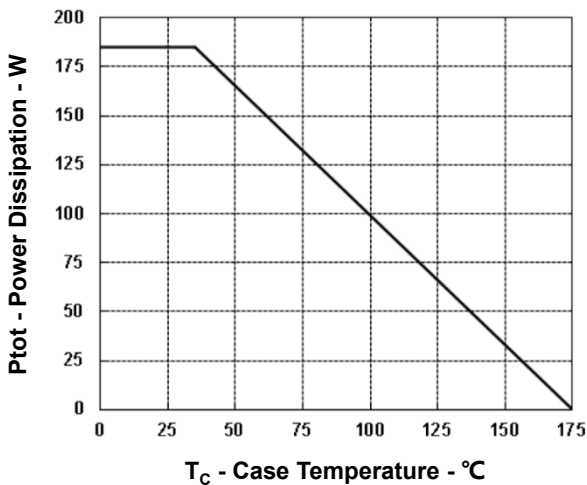


Fig.17 Power Dissipation - T_C Characteristics

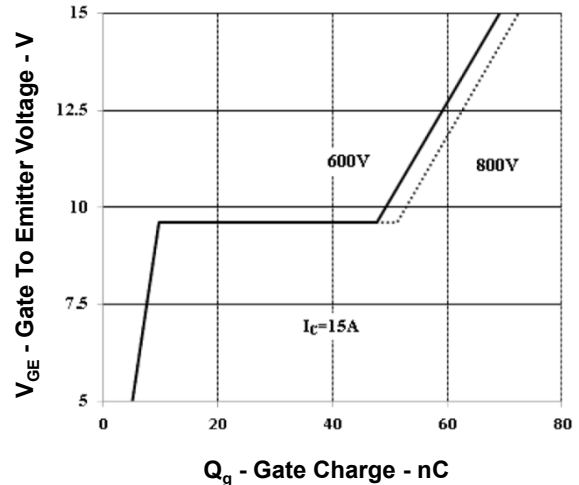


Fig.18 Typical Gate Charge

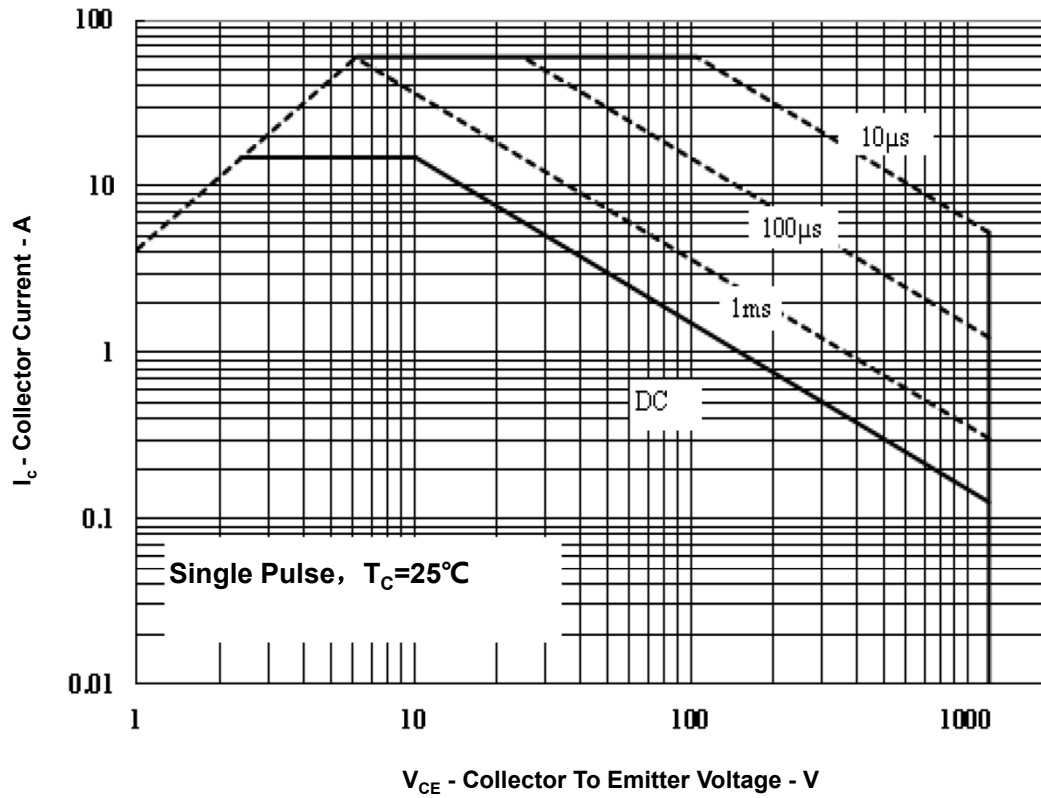


Fig.19 Forward Bias Safe Operating Area

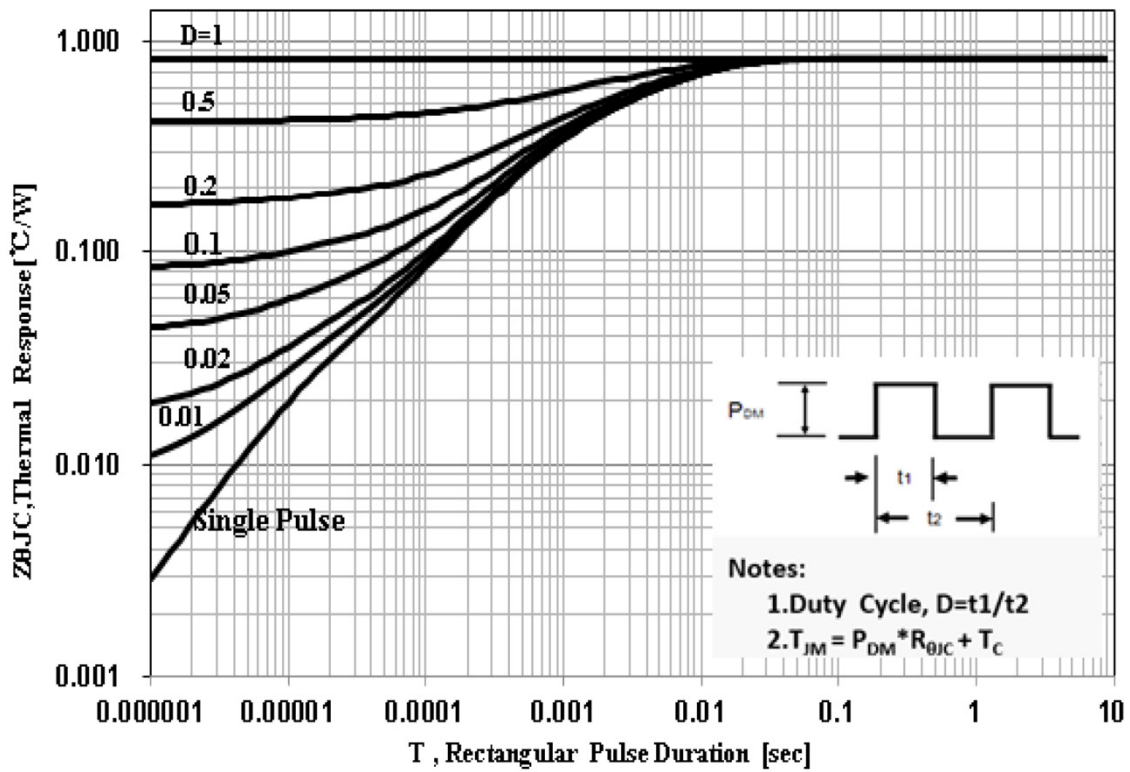
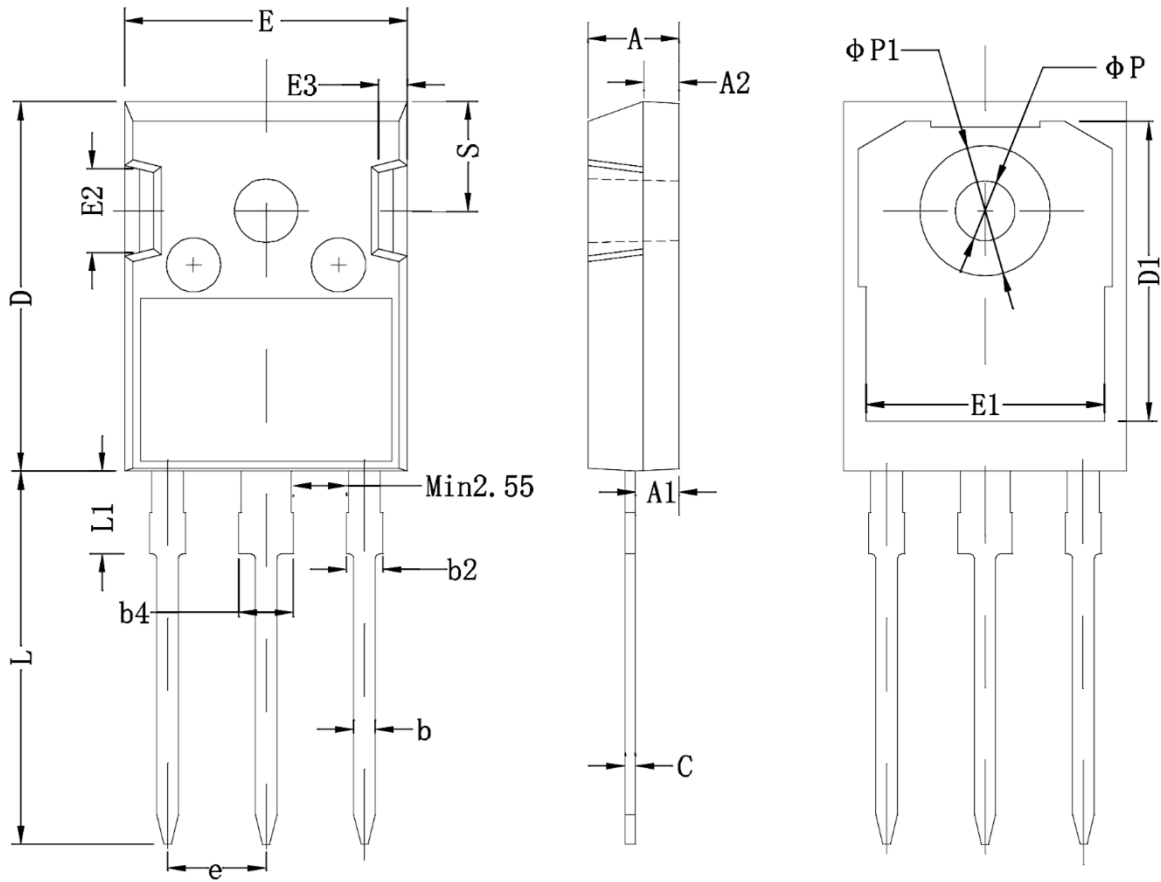



Fig.20 IGBT Transient Thermal Impedance

Product Dimension (TO-247-3L)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	4.80	5.20	0.189	0.205	E1	13.00	13.60	0.512	0.535
A1	2.21	2.59	0.087	0.102	E2	4.80	5.20	0.189	0.205
A2	1.85	2.15	0.073	0.085	E3	2.30	2.70	0.091	0.106
b	1.11	1.36	0.044	0.054	e	5.44 BSC.		0.214 BSC.	
b2	1.91	2.21	0.075	0.087	L	19.82	20.22	0.780	0.796
b4	2.91	3.21	0.115	0.126	L1	-	4.30	-	0.169
c	0.51	0.75	0.020	0.030	φP	3.40	3.80	0.134	0.150
D	20.80	21.30	0.819	0.839	φP1	-	7.30	-	0.287
D1	16.25	16.85	0.640	0.663	S	6.15 BSC.		0.242 BSC.	
E	15.50	16.10	0.610	0.634					


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